We claim:

1. A fuel cell cathode catalyst comprising nanostructured elements which comprise microstructured support whiskers bearing nanoscopic catalyst particles, said nanoscopic catalyst particles made by alternating application of first and second layers, said first layer comprising platinum and said second layer being an alloy or intimate mixture of iron and a second metal selected from the group consisting of Group VIb metals, Group VIIb metals and Group VIIIb metals other than platinum and iron, where the atomic ratio of iron to said second metal in said second layer is between 0 and 10, where the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 5, and wherein the average bilayer planar equivalent thickness of said first and second layers is less than 100 Å.

2. The fuel cell cathode catalyst according to claim 1 wherein the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 2.5, and wherein the average bilayer planar equivalent thickness of said first and second layers is greater than 8 Å.

3. The fuel cell cathode catalyst according to claim 1 where the atomic ratio of iron to said second metal in said second layer is between 0.01 and 10.

4. The fuel cell cathode catalyst according to claim 1 wherein said second metal is selected from the group consisting of nickel, cobalt and manganese.

5. The fuel cell cathode catalyst according to claim 3 wherein said second metal is selected from the group consisting of nickel, cobalt and manganese.

6. The fuel cell cathode catalyst according to claim 1 wherein said second metal is nickel.

7. The fuel cell cathode catalyst according to claim 6 wherein the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 2.5,

and wherein the average bilayer planar equivalent thickness of said first and second layers is greater than 8 Å.

8. The fuel cell cathode catalyst according to claim 3 wherein said second metal is nickel.

9. The fuel cell cathode catalyst according to claim 8 wherein the atomic ratio of iron to nickel in said second layer is between 0.01 and 0.4.

10. The fuel cell cathode catalyst according to claim 8 wherein the atomic ratio of iron to nickel in said second layer is between 0.01 and 0.15.

11. The fuel cell cathode catalyst according to claim 1 wherein said second metal is cobalt.

12. The fuel cell cathode catalyst according to claim 11 wherein the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 2.5, and wherein the average bilayer planar equivalent thickness of said first and second layers is greater than 8 Å.

13. The fuel cell cathode catalyst according to claim 3 wherein said second metal is cobalt.

14. The fuel cell cathode catalyst according to claim 13 wherein the planar equivalent thickness ratio of said first layer to said second layer is between 0.3 and 2, and wherein the average bilayer planar equivalent thickness of said first and second layers is greater than 8 Å.

15. The fuel cell cathode catalyst according to claim 1 wherein said second metal is manganese.

16. The fuel cell cathode catalyst according to claim 15 wherein the average bilayer planar equivalent thickness of said first and second layers is greater than 8 Å.

17. The fuel cell cathode catalyst according to claim 3 wherein said second metal is manganese.

18. The fuel cell cathode catalyst according to claim 17 wherein the planar equivalent thickness ratio of said first layer to said second layer is between 1.25 and 5.

19. A method of making a fuel cell cathode catalyst comprising nanoscopic catalyst particles comprising the alternate steps of vacuum deposition of a first layer comprising platinum and vacuum deposition of a second layer comprising an alloy or intimate mixture of iron and a second metal selected from the group consisting of Group VIb metals, Group VIIb metals and Group VIIIb metals other than platinum and iron, where the atomic ratio of iron to said second metal in said second layer is between 0 and 10, wherein said deposited platinum and said deposited alloy or intimate mixture of two metals form a bilayer having an average bilayer planar equivalent thickness of less than 100 Å, wherein the planar equivalent thickness ratio of deposited platinum to the deposited alloy or intimate mixture of two metals is between 0.3 and 5.

20. The method according to claim 19 wherein said vacuum deposition steps are carried out substantially in the absence of oxygen.

21. The method according to claim 19 wherein said platinum and said alloy or intimate mixture of iron and a second metal are deposited on microstructured support whiskers.

22. The method according to claim 19 wherein said second metal is selected from the group consisting of nickel, cobalt and manganese.

23. The method according to claim 19 wherein said second metal is nickel.

24. The method according to claim 19 additionally comprising the step of removing at least a portion of said alloy or intimate mixture of two metals after said deposition steps.

25. A fuel cell cathode catalyst comprising nanoscopic catalyst particles made according to the method of claim 23.